

# MESOPOTAMIAN DESERT LEPIDOPTERA<sup>1</sup>

BY

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## THE DESERT.

The desert with which this article deals covers a wide area; yet it cannot be clearly separated from the Syrian and Arabian deserts by any line of demarcation, and indeed also merges, though less imperceptibly, into the mountainous desert regions of Southern Iran. The localities at which the insects in the list were taken are in Syria, Iraq and Iran, though mostly in the second, but faunistically the area concerned can be regarded as one and the same and may suitably be termed 'Mesopotamia', a name now devoid of political connotation. The area's homogeneity does, however, allow of certain minor climatic differences, between the northerly and southernmost localities. For instance, the average humidity on the desert shores of the Persian Gulf is between 70% and 80%, that at Bagdad 56%, and that at Mosul well below 50%; and the average rainfall at Bagdad is 9 inches (230 mm.), and at Bushire 12 inches (300 mm.). This rain only falls in the winter.

The Mesopotamian desert is geologically of two kinds: the stony upland, and the alluvial plain. The former lies northward of the latter, but encircles it like a horse-shoe. To the north-east of the alluvial plain are the foot-hills and ridges of the Zagros range; to the south-west of it, the low plateau of scorched steppe whose northern part is the Syrian, whose southern, the Arabian, desert. A line drawn from Ramadi to Balad, about fifty miles north of Bagdad, approximately marks the northern limit of the alluvial plain. This plain is geologically very recent. Until, and probably during most of the Pleistocene period, the waters of the Persian Gulf covered it. Then the swiftly-advancing delta of the Karun and Kerkheh turned the sea-arm north of these two rivers into a vast lagoon, which gradually silted up with the slower advance of the Euphrates and Tigris delta, and passed, after a transitional marsh stage, into its present desert condition, only relieved by the more or less extensive irrigation systems of antiquity and today. This alluvial desert is less rich in life than the upland desert for reasons given below; so that, even after Central

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<sup>1</sup> This article is an abbreviated version of an article already announced as under preparation with the title 'The Saharan and other affinities of the Mesopotamian Fauna'. The present state of Europe has made it impossible to complete the zoogeographical analysis of the desert insects here recorded, and I have therefore excised the zoogeographical sections, as the change in the title indicates; the analysis will, it is hoped, appear later, together with one or two additions to the list of species not yet determined. The present article is thus a truer companion to those already published about Iraqi lepidoptera, viz: 'Lepidoptera of a Bagdad Orchard' (*Ent. Rec.* Feb. 1939), 'Autumnal Lepidoptera in Kurdistan' (*Ent. Rec.* Aug. and Sept. 1937) and 'More Notes on Kurdish Lepidoptera' (*Ent. Rec.* July and October 1939).

Iraq became dry land this alluvial plain was a barrier to some of those steppe species that inhabited the western and eastern shores of the former Gulf and prevented the races which had there grown up from any re-admixture. This explains the eastern and western Iraqi races of *Euchloe charltonia* and *Zegris eupheme*.

The alluvial plain is composed of a light calcareous loam, unusually rich in lime, and in many places salty,—the eroded waste of the limestone hills of Armenia and Iran. This soil forms a fine dust when dry; frequent strong winds scour its surface; in the spring it is liable to extensive inundation, and the lakes so formed usually stand for months, and sometimes for a year, but eventually dry up. Such conditions are particularly unfavourable to animal and vegetable life. The upland desert, however, (gypsum, conglomerates, sandstone, etc.) is a scorched steppe and boasts a more varied vegetation, its stony soil providing plants with a firmer hold and rocks and in places cliffs giving shelter to the more sensitive kinds. After rains, the desert blossoms, sometimes becoming a mass of colour for a short period; on the other hand, standing pools quickly drain away. Such are the conditions responsible for the greater richness of the upland desert fauna. Similar causes also operate to favour the desert hills of the south-east. In southern Iraq and Khuzistan a degree of confusion between the alluvial desert and the marshes occurs and the higher humidity of these parts also enriches the desert-fauna to a certain extent. The foothills of the Zagros however lack this ambiguity and prolong our desert area, on the east shores of the Persian Gulf, towards India. The mountains and coastal plain here however enjoy a more humid climate than the northern and western fringes of our area, while remaining typically desertic. The true boundary of our desert area along the whole length of the vast Zagros chain is the lowest limit of the woodland zone, though in many places deforestation has obscured its whereabouts; that is, at about 1,500 feet in the north, (Kurdistan) and at about 3,000 feet in the south (Fars). The easterly offshoots of the Taurus, and the southward-running Lebanon range may be said similarly to demarcate this vast desert in the north and west; I am unable here to discuss the Anti-Lebanon and Transjordanian hills which are steppe-like and resemble the Persian mountains. Just as the Mesopotamian desert's ground rises slowly northwards towards Mosul, so the Syrian desert rises imperceptibly but steadily westwards towards Palmyra and Damascus; in fact one could say the same of all Arabia. Climatic conditions therefore obviously must differ at different localities in the Arabian-Syrian-Mesopotamian desert, but the translation from the low desert with mild winters to the high with regular snowfalls is gradual. In no part however is the area as high as the high steppes of Anatolia and Iran; and even the latter, of course, are not in the same class as the Russian steppes, which are covered with deep snow during a longer winter, and, indeed sometimes enjoy summer rainfall. There is comparatively little sand in those parts of the desert with which this article deals,—certainly nothing to compare with the dunes of Arabia or the Sahara.

*The Desert Insects.*

The list which follows is one of species of lepidoptera taken by myself during the last five years. I have endeavoured to confine it to desert-species, leaving those characteristic of other biotopes to be dealt with elsewhere; in a word, it deals with an ecological category of insects, not with a zoogeographical category; for the former, I use the word 'desert-species' or 'desert-insect' (just as I use 'desert-tree' and 'desert-animal')—meaning one regularly found in the desert, whereas for the latter I use the term 'eremic'.

Desert-insects, by the above definition, are those for whom the desert is a means of distribution; they may feed on desert plants, or, breeding elsewhere, may be regular migrants over the desert. But desert-flora itself varies locally, not only according to the latitude and altitude, but according to the nature and the drainage of the soil at any one place. Certain valleys or quite shallow depressions, which are not oases because they contain no wells, no cultivation, and, except immediately after heavy rains, no surface water, nevertheless boast a denser and more varied vegetation, and consequently a richer insect-fauna, than the surrounding ground. Such flora and fauna must be regarded as of a desert kind. It is however rare to find tamarisks growing in the Mesopotamian desert except where there is perennial surface-water, and I class the tamarisk as an oasis-tree here. In other deserts this may not be so. The nebek or sadr tree (*Zizyphus Spina-christi*) however must be considered a true desert-tree of our area, though limited only to certain parts of it, in the south. One might also include the wild pistaccio (*Pistacia mutica*) as a desert-tree of Mesopotamia, for it is still to be found on the Jebel Abdul Aziz, Jebel Sinjar, and some of the hills between Raqqa and Palmyra, and once grew on other desert-hills in N. Iraq, its disappearance from which is probably due to centuries of charcoal-burning; no entomologist has however visited these desert-mountains where the tree still grows, so I do not here record the species usually associated with this tree, such as *Thaumetopoea solitaria* and *Oulobophora externata*, which one might expect in these places. Perhaps these surviving trees are the relics of a woodland which in the several pluvial periods of the Pleistocene Age may have covered a great deal of the desert.

Oasis-insects, if not also desert-insects, are excluded from this paper:—i.e. those species biologically dependent on poplar, tamarisk, fruit-trees, crops, shady undergrowth, or marsh-plants, which do not also migrate over the desert. They are treated in two separate papers, one concerned with the orchard species, the other with the river species. The first of these papers is quoted in footnote (1), p. 826 while the second, dealing with the insects attached to tamarisk and Euphrates poplar, has not yet been published.

Such plants as *Alhagi camelorum* and *Prosopis stephaniana*, which are typical desert-plants, thrive also in oases; similarly many true desert-moths are to be found breeding in numbers in oases. Oases therefore are much more ambiguous biotopes than the desert, in which one finds few species from other biotopes, and those few wandering intruders.

The ecology of desert-insects has been ably discussed by Buxton<sup>1</sup>, Bodenheimer<sup>2</sup>, and Amsel<sup>3</sup>, so no detailed account of it is here called for. Suffice it to say, that insect activity is concentrated in the early summer and autumn, the two seasons when the climate is most favourable, with larval activity in late autumn and spring. Between these two active periods come the winter and summer pauses, during which imaginal flight is much rarer. *Ocnogyna loewi* is the principal winter moth, while *Zizera galba* and several Cossids are the most successful midsummer fliers. Rootfeeding or diurnally subterranean larval habits enable many species to appear in the utmost profusion as adults, even in the most dry and torrid parts of the desert.

The facies of desert insects is in general lighter than that of lepidoptera from colder and moister climes. Bold disruptive colouring appears on the wings of several species, though not so frequently as on the Iranian plateau; more frequently black bands on a white hindwing form a striking contrast to 'desert-coloured' forewings, and operate as 'flash' colouring in flight. Dayflying is more frequent in the Agrotidae than in less hot climates. Metallic gold or fiery-brown markings on a white satin ground, are another colour-scheme favoured by the representatives of unrelated families. A desert-collector's cabinet thus recompenses him, by its attractive contents, for the cheerless scenery in which he collects.

The Agrotidae and the Pyralidae are the families of Lepidoptera best represented in the desert. Geometridae, which are to a large extent a wood-loving family, are comparatively few.

While many of the desert-species in the list have vast range, there are one or two notable local species (e.g. *Lithostege buxtoni*, *Armada leprosa*) which seem only to range from the Iranian plateau to the plains below.

A brief summary of the faunistic affinities of the desert-species was given in my article 'Insect Biotopes in Syria Iraq and Iran' (*Ent. Rec.* April 1940), anticipating the analysis referred to in footnote (1).

#### DESCRIPTION OF LOCALITIES.

##### 1. Mosul Desert (M. D.)

The exact place is Kharbat al Bayadir near Tel Hawa, 1,200 ft.; undulating steppe-desert between Jebel Sinjar and the Turkish foothills. Inhabitants, Shammar Arabs. Visited in vi-viii, 1935.

##### 2. Mosul (M).

Similar country, 700 ft., on the banks of the Tigris. There is practically no irrigation here, but in places spring barley is grown. Visited, mid-v to ix-35, and x-36. Inhabitants mixed Arab, Kurd, and Christian (Semitic).

##### 3. Fatha Gorge (F. G.)

The Tigris here breaks through the Jebel Hamrin, a ridge whose height is nowhere more than 600 ft. No cultivation or river trees. A brief day-time visit 30-iii-36. Arabs.

<sup>1</sup> *Animal Life in Deserts* by P. A. Buxton, London, 1923.

<sup>2</sup> *Animal life in Palestine* by F. S. Bodenheimer, Jerusalem, 1935.

<sup>3</sup> *Die Lepidopteren Palastinas*, by H. G. Amsel; *Zoogeographica* Oct. 1933.

**4. Baiji (Bi.)**

A few miles S.-W. of 3. Open steppe-desert. A single night, at the pipe-line station, 1-x-36. Arabs.

**5. Haditha (H.)**

At 400 ft., in typical Syrian-desert country, a mile or two east of the Euphrates. One night at the pipe-line station, 30-ix-36. Arabs.

**6. Palmyra (P.)**

In the centre of the Syrian desert. Height, 1,300 ft. Visited on two nights, 7-iv-34 and 29-ix-36, the latter visit being to station T. 3 on the pipe-line. Arabs.

**7. Table Mountain (T. M.)**

The Dyala here breaks through the Jebel Hamrin. Height, 200-400 ft. Visited several times in iii and iv-36. No cultivation. Arabs.

**8. Qaraghan (Q.)**

The Dyala here flows between low hills and plateaux, the foot-hills of the Zagros. Close by is the similar locality of Qizil Robat, where Peile took many of the butterflies described in *Journ. Bombay N.H.S.*, Dec. 1921 and March 1922. Quite similar to 7. Visited in iii-37. Arabs and Kurds mixed.

**9. Jebel Darwishka (J. D.)**

Height 750 ft. (*Fasilah Pass*). The road here passes over one of the foot-hills mentioned under 8, before dropping down to locality 10. Bare arid hills of conglomerate. Visited, iii-36, iii-37, and xi-xii-36. Arabs and Kurds.

**10. Khanikin (Kh.)**

On the Dyala, between 9 and the Zagros. Some palm-gardens and other cultivation on a narrow alluvial strip between stony hills and plains. Visited same times as 9. Arabs and Kurds.

**11. Naft-i-Shah (N. S.)**

On the Persian side of the frontier, but similar country to localities 8, 9, 10, and adjacent to them. Visited on one night, 14-xi-39.

**12. Bagdad (Bd.)**

Alluvial plain, irrigated by lift from the Tigris. 100 ft. Was collected in all the year round. Orchards, gardens, and river trees make this a very ambiguous locality. Arabs.

**13. Seleucia (Sa.)**

In the alluvial plain, near Bagdad. Irrigated crops, but few trees. Arabs.

**14. Kerbela Desert (K. D.)**

Steppe desert, 600 ft., more arid than the Mosul Desert, but even so with some thick patches of local low vegetation. The actual locality is 150 miles west of Kerbela, 20 miles north of Nukhaib Post, at Habbariyah well. I visited this place for two nights in late iii-37, and from that date until vi-37 Mr. Diamond, who was in camp there, collected regularly for me everything that came to light. This material therefore gives a fairly complete picture of desert moths in this area flying before the midsummer pause. Anizeh Arabs.

**15. Ukhaider (U.)**

Similar to 14 but rockier. 400 ft. 50 miles west of Kerbela. A fine ruined castle is the focal-point for butterflies here. A short daylight visit, 29-iii-37. Anizeh Arabs.

## 16. Nejf (N.)

400 ft., steppe desert, even more arid than 14. Arabs. Visited, 26-III-37.

## 17. Salehabad (S.)

Irrigated steppe desert, a flat plateau at 600 ft. Near Dizful, Persia. Also called Andemeshk. Visited on single nights, 4-iv-38, 29-x-38. Bakhtiari winter quarters.

## 18. Ahwaz (A.)

A ridge of sandstone outcrops from the alluvial plain of Khuzistan. Height, 200 to 400 ft. With a south wind, the climate can be very humid; the winters are also milder than most of the preceding localities. Was collected in during iv, v, vi, viii, ix and x-38. Population, mixed Arab and Persian. The river Karun breaks through the ridge, and provides water for a certain amount of cultivation. Some nebek trees.

## 19. Maidan-i-Naftun (M. N.)

Arid limestone and gypsum hills (c. 1000 ft.), with considerable low herbage, and water in the principal valleys. Visited 5-v-38. Bakhtiari Inhabitants.

## 20. Bushire and Dalaki (Bsh. &amp; D.)

Though my collecting in Farsistan is not concluded yet, it will not be out of place to add to this article several records made at and near Bushire in xi-40. Bushire is a low peninsula of mixed sand, gypsum and sandstone, with a certain number of nebek, *Prosopis* and other trees. The Filfil Pass near Dalaki, is a completely arid but hilly locality, 800 ft. in the lowest Zagros foothills. Both these localities are unpleasantly hot and humid in summer, pleasant in winter. Inhabitants, of mixed race.

The initials in brackets are used as abbreviations for the above localities in the following records.

P., H., K. D., U., and N. are west of the Euphrates.

T. M., Q., J. D., Kh., and N. S. might be regarded all as one locality, and they, together with S., A., M. N., Bsh. and D. are east of the Tigris and subject to a strong Iranian influence.

The localities are given above in order north to south.

M. D., and M. are well north of the limit of palm-cultivation, while F. G., B., H. and P. lie slightly north of the limit.

Specimens collected at Kh., Bd., Sa., S., and some of those at A. were taken on ambiguous ground (i.e. oasis and desert fauna), those at M, M.N., and Bsh. on slightly ambiguous ground; the rest of the localities collected at were unrelieved desert.

## LIST OF DESERT LEPIDOPTERA.

(Taken by the author at the above localities).

If no locality is indicated for an insect below, it may be taken that that species is generally distributed in the whole area.

## RHOPALOCERA.

**Papilio machaon** L. **centralis** Stgr.

On low foot-hills, at Q, etc., in spring.

**Zegris eupheme** Esp. **tigris** Riley and **dyala** Peile.

The form *tigris* occurs from Transjordan eastwards into Iraq where F. G., east bank of Tigris, is its easternmost known limit. The Jebel Hamrin, however, on which it breeds and flies, extends hence without interruption into the territory of the other form, *dyala*, which, first taken near Q by its author, flies also on J. D. and extends thence south-eastwards into Farsistan, where Brandt took it at about 2,550 ft.

Detailed information about this and other butterflies was given by Peile, *loc. cit.*, so I abbreviate my comments on this and other Rhopalocera, to avoid repeating.

Short migrations have been recorded of this species but it cannot be a long-distance-migrant.

**Glycestha aurota** Fab. (= *mesentina*)

This species passes the winter as an imago in the low hills around Q, and thence south-eastward.

**Euchloe ausonia** Hbn. *persica* Verity.

**Euchloe belemia** Esp.

**Euchloe charlonia** Douz. *mesopotamica* Stgr. and *transcaspica* Stgr.

The bright yellow form *mesopotamica* occurs at U., while the whiter *transcaspica* flies in iii and iv at T. M., Q., and J. D., and thence into Fars where Brandt took it with *dyala*. Pfeiffer regards this race as distinct from *transcaspica*, to which Riley and Brandt attribute it.

**Pontia daplidice** L.

**Pontia glauconome** Klug. *iranica* Bien.

**Colias croceus** Fourc.

Noted in the Iraquian plain in every month except viii and ix.

**Teracolus fausta** Oliv.

**Catopsilia florella** F.

At J. D. and F. G., in iii and iv. Perhaps not every year, for Peile did not record it.

**Eumenis telephassa** Hbn.

**Eumenis persephone** Hbn.

**Eumenis pelopea** Klug.

The third of these species I only found at M.D., but the others are widespread.

**Pyrameis cardui** L.

On the wing all the winter, but less seen in summer than *croceus*, the other migrant which breeds here. Foodplant: *malva parviflora*, etc.

**Melitaea trivia** Schiff.

Not seen on the alluvial plain.

**Danais chrysippus** L.

At Bd. a garden insect, feeding on *Asclepias curassavica*, but associated with *Calotropis procera* in the desert in the south-eastern corner of our area.

**Chilades galba** Led.

**Chilades trochilus** Frey.

**Tarucus theophrastus** Fab.

**Tarucus mediterraneae** B-B.

**Tarucus balkanicus** B-B. *areshanus* Frr.

At Bagdad the nebek is an oasis-tree but in the south-east corner of our desert area it grows in the desert, accompanied by the above three species.

**Hesperia geron** Wats. (det. Evans).

Three dwarf specimens near A, 16-x-38.

**Eogenes alcides** H. S. **elama** Wilts.

M. N., 6-v-38. This remarkable local form <sup>1</sup> differs in having the less-pointed forewing unmarked except for three small contiguous apical spots in spaces 6 to 8.

**Adopaea thaumas** Hufn.

M. N., in V.

## HETEROCERA.

**Syntomis aurivala** Schaw.

This rare species has been re-taken at Abu Wajna near Mosul, on 7-v-29, by Yusuf Lazar, the collector for the Field Museum Chicago. I do not know the exact whereabouts of this locality.

**Utetheisa puchella** L.

This species breeds in Iraq. Commonest in autumn.

**Ocnogyna loewii** Z.

Widespread except on the alluvial plain.

**Axiopaena maura** Eich.

One perfect specimen indoors at Bsh, in v-40, a most surprising date, since I had previously only taken the species in the autumn in the Kurdish hills. Watkins (in *Journ. Bombay N. H. S.*, Dec. 1921) recorded a specimen of *Lasiocampa grandis* taken at Amara in May 1917. Until my capture of *maura* I almost inclined to think that that date was an error, but it may be that certain species, normally autumnal, regularly emerge in early summer in very torrid desert localities and perhaps aestivate. The perfect condition of my *maura* was in strong contrast to the usually ragged condition of this moth in the hills in autumn, and this suggests to me that perhaps the specimen was sexually immature, and that aestivation plays a part similar to hibernation in *Vanessa urticae* in England. I have however no proof that aestivation takes place, nor has the specimen been dissected. But these two records certainly raise a point which desert collectors should not lose sight of. (I have taken *L. grandis* at 5,000-6,000 ft. near Shiraz in the autumn, thus confirming Watkins' record. Its occurrence at Amara and Shiraz would make it probably eligible for inclusion in this list as a desert-moth.)

**Chondrostega aurivillii** Pungl. **feisali** Wilts.

Bi., H., Q., and near A. The male comes to light in early x, and the larva often swarms in iii and iv.

This form (1) is about the same size as *fasciana* Stgr., which is probably conspecific, but with a white ground colour, and brown median and sub-marginal bands, which often almost vanish. Typical *aurivillii* are apparently more heavily marked and smaller. In Arabia an extreme development of *feisali* occurs, in which the wings are pure white and unmarked. The larva is described in the full description referred to in footnote (1), p. 826.

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<sup>1</sup> A full description, with photographs, of the two new forms *elama* and *feisali* is being published elsewhere; but if these should prove not to have priority the above brief descriptions must be taken as the preliminary but valid ones.

**Chilena proxima** Stgr.

The commonest Bombyx in Iraq, and a characteristic insect of the Mesopotamian desert, from the Turkish foot-hills to Khuzistan. The pretty lackey caterpillar, described at length and figured in *Ent. Rec.*, June 1940, feeds in rapid successive broods on *Prosopis stephaniana*.

**Celerio lineata livornica** Esp.

Two broods occur in spring and early summer, and the larvae are often to be seen in profusion in the desert at that season; the imago sometimes appears in the autumn. A well-known migrant.

**Macroglossa stellatarum** L.

A well-known migrant.

**Dyspessa asema** Pungl. (det. le Cerf)

Two specimens at K. D. in early v.

**Dyspessa wiltshirei** Dan.

Q., 14-iii-37; the types.

**Stygia saharae** Luc. (det. le Cerf.)

Common to light, M. D., vii-viii. This is the first record of this species outside Africa.

**Holcocerus gloriosus mesopotamicus** Watk.

Most variable in extent of markings and size. Common to light at K. D. from 20-v to 20-vi-37. A single specimen taken at A on 16-viii is apparently *f. laudabilis* Stgr., which I have little doubt is the Palestinian form of this species, and not a distinct species.

**Bryophila divisa oxybiensis** Mill.

M.D., in v.

**Bryophila tabora** Stgr.**Bryophila** probably **eucta** Hamps.

These two species were taken at M., 3-x. Stone is plentiful here, but desert conditions in most other localities do not favour this genus, which feeds on lichen, so it is not surprising that I only took representatives in the north.

**Euxoa conspicua** Hbn.

Common in iv-v, and again in ix-x; widespread except in alluvial plain.

**Euxoa canariensis** Reb. **diamondi** Brsn.

18-iv-37, K. D. (the type of the subspecies.). The same form of this widely distributed Eremic species has been taken by Brandt in Fars.

**Agrotis segetis** Hbn.**Agrotis ypsilon** Rott.

This species seems to appear, in the desert and oases of the Mesopotamian plain, only in the cooler months between ix and vi. It has been suggested that a migration to higher ground accounts for its summer absence, but this suggestion seems to me to be unnecessary, aestivation being so frequent in lepidoptera in the desert, though I have certainly taken it on the wing in high mountains during those months when it is not to be seen at lower elevations. The same seems to be the case with *segetis* Hbn. These species that fly continuously during the cooler months are not in the same class as those

which have two distinct generations, in autumn and spring, such as *Dyscia plebejaria*, *Elaphria bodenheimeri*, and *Cornifrons ulceratalis*.

**Agrotis crassa golickei** Ersch.

*Golickei* is perhaps an oasis-insect at Bagdad, but further north seems to be a true desert habitant. Autumnal.

**Agrotis flavina** H. S.

This species, typical of the high steppes of Turkey and Iran, occurs in the desert only at the higher elevations, e.g. M., 18-v-35. I have also taken it, in the Bekaa (Syria), and at Hamadan and Tehran, and Brandt has recorded it from as far south as Farsistan.

**Agrotis puta** Hbn.

Kh., 27-xi. Also at Kirkuk in iii-36.

**Agrotis (Powellinia) lasserrei** Ob.

The reddish hue of Iraqi specimens seems to put them closer to N. African than Central Asian forms. Very common in xi on both alluvial and stony desert.

**Agrotis (Powellinia) matritensis** Vasq.

Bsh. 21-23. xi. These examples have rather dark grey hindwings: males: to light. (Also taken at Bi. by Peile, 1919).

**Agrotis haifae** Stgr. (det. Brsn.)

J. D., 7-x. Boursin gives as synonyms or races of this species: *hoggari* Roths., *securifera* Tur., and *saracenica* Tams.

**Rhyacia flammata** Schiff. **centralasiæ** Wagn.

A steppe insect, with a similar range to *flavina* (*vide supra*) M. and M. D., in v, vi, and x.

**Rhyacia taurica** Stgr. (b. sp.) (det. Brsn.)

M., x-36.

**Triphaena pronuba** L.

K. D., iv.

**Actinotia hyperici** Schiff.

M. D., in vi.

**Polia consanguis** Guen.

P., 30-ix.

**Pronotestra silenides** Stgr.

K. D., iii.

**Scotogramma trifolii** Rott. (= *taylori* Roths.)

**Discestra arenaria** Hamps.

A, late iv and x, 38, with a partial brood in captivity in v. The larva was described and figured in *Ent. Rec.* June 1940.

**Discestra eremistis** Pungl.

Near A, 14-x-38. Boursin wrote of this example: 'Si ce n'est pas *eremistis* c'est *vaciva*; mais du point de vue biogéographique, c'est la même chose.'

**Cardapia** sp.

P., 30-ix.

**Hphilare loreyi** Dup.

**Brachygalea albolineata** Blach.

One specimen, 5-iii-37, Bd. Previously only known from Tunis and Algeria.

**Cucullia boryphora** F-Wald. (det. Boursin).

K. D., iii- and iv-37. Known from Central Asia, S. Russia, Armenia and Anatolia, and, according to Boursin, 'probably the same as the Spanish *achillea* Guen.'

**Cucullia strigicosta** Brsn.

The types were reared from larvae found on the ridge of J. D. in iv-36, hatching in iii-37. Foodplant, *Scrophularia*.

**Cucullia wredowi** Costa (det. Boursin).

T. M., Bd, Sa, and A. Also on the Iranian high plateau, and known from Anatolia, Italy, S. France and N. Africa. The larva of the Iraqi moth differs recognisably from that of the Lebanese *wredowi-judaeorum* Strand.

**Lithophasia** = (**Hypomecia**) **quadrivirgula** Mab. (det. Brsn.)

Three females to light, J. D., 14-xi-36. They belong to the N. African form, not to the Palestinian, *jordana* Stertz.

**Copiphana gafsana** Blach. (det. Brsn).

K. D., 28-iii-37. Previously only known from Tunis.

**Metopoceras delicata** Stgr. (det. Brsn).

The rather dark-rose female from T. M. was determined by Boursin as this species, and not as *pilleti* Brsn, which I thought it was on catching it. The type of *pilleti* was taken at Deir es Zor, on the Euphrates (Syria) from which I have ordinary specimens of *delicata*. Only one female of *pilleti* has ever been caught and I suspect it to be an extreme aberration of *delicata*. The T. M. example was taken in xi, and a series from K.D. (1-v-37) is paler, and more typical.

**Metopoceras omar** Ob.

The form *caspica* Alph. certainly occurs in Iraq but this name cannot be used, as by Rothschild, to describe the race. The species varies here from ash-grey to deep red-brown. I infer that there are two consecutive spring broods from the following records: T. M., 13-iii-37, a very varied series; K. D., 1 to 6-v-37, a paler, less varied series. Common at A. in iv. Brandt refers his *Farsistan* examples to *felix* Stfs.

**Cleophana pectinicornis** Stgr. (det. Brsn).

A common spring moth on the stony desert, previously only known from N. Africa.

**Cleophana jubata** Ob. (det. Brsn).

A N. African species, flying in Iraq commonly together with *baetica* Q, K. D.

**Cleophana baetica diluta** Roths.

T. M., Q, K. D. Common to light in iii and iv. Also known from Spain, N. Africa, the Taurus, Georgia, and Farsistan,

**Calophasia pampaninii** Krug.

K. D., 31-iii-37, one. Previously only known from Cyrenaica.

**Metalopha liturata** Chr.

S, 4-iv-38.

**Acrobyla kneuckeri** Rebel.

Two, in iv at A. The type being inaccessible, the species has been determined according to the British Museum's examples from Arabia. The Ahwaz form is darker than these, though closer to them than to *ariefera* Hamps.

**Derthisa lederi** Christ.

Kh., in xi. Commoner a little earlier higher up in the Zagros range.

**Aporophila nigra** ssp. n. **dipsalea** Wilts.

This remarkable desert form (perhaps also occurring in the Zagros hills) differs from the typical by its lighter, 'drier' coloration. Forewing, above: pale wood-brown, with a somewhat obfuscated median area, and a narrow dark grey marginal shade, approaching which the nervures become dark grey also. Lines, clear, outlined in sooty brown. Orbicular stigma, with grey centre and pale outline; reniform, similar, the distal outline being whitish. Fringe, smoky grey with lighter brown interruptions at the nervures. Under-side, greyish white with a pale coppery glint; nervures and post- and ante-median lines distinctly outlined in faint brown; reniform stigma, darker brown; fringes darker brown. Hindwing (male) white, with nervures marked in pale brown and margin in rather darker brown. Expanse, 40 mm.

Holotype, ♂, 14-xi-39, Naft-i-Shah. In coll. m.

The distinctly brownish race found in the Lebanon seems to be an intermediate between the normal and the desert forms, and is larger than *dipsalea*, spanning 46 mm.

**Antitype canescens** Dup.

This typically Mediterranean moth also flies commonly in autumn in the Zagros up to at least 5,000 ft. (Kermanshah and Shiraz), but also comes down to the lowest desert: Bsh., and D., late xi. The larva is here polyphagous, but especially fond of *Calendula*.

**Autophila limbata** Stgr. (det. Brsn).

M. D., vi-35.

**Autophila cerealis** ssp. **amseli** Drdt.

A, K. D., common in iv and v, the 10-footed larva feeding on *Salvia*.

**Autophila cymaenotaenia** Brsn. ssp.

K. D., 4-v-37, one.

**Apepestes spectrum** Esp.

M. D., in vi. In the Lebanon, it flies in ix, at Suleimani (S. Kurdistan) a specimen was taken in xii; at Hamadan, it first emerged in early vi. I have never seen any sign of second-brood larvae, and believe the late Suleimani date can be explained by its habit of long rests and ultimate hibernation indoors. In Mediterranean areas it feeds on Spanish broom, but in the interior of Iran I have found *Glycyrrhiza* bushes amidst cultivation infested locally with its larvae and cocoons. This is probably its chief foodplant in Mesopotamia.

**Tathorhynchus exiccata** Led,

K. D., 14-iv-37, one.

**Scythocentropus inquinata** Mab.

P., 30-ix. Previously known from Tunis.

**Pseudohadena chenopodiphaga** Ramb.**Prodenia litura** F.**Hypeuthina fulgurita** Led.

Kh. and Bsh., xi. At 3,000 ft. in the Bekaa (Syria), at coast-level in the Lebanon, at about 2,000 ft. in Kurdistan, and at 3,000 ft. in Farsistan (Shapur), this species is associated with *Stilbina hypaenides* Stgr, which flies with it, but I have not yet taken *hypaenides* in the desert proper, unless Shapur (an intermediate locality) be considered such.

**Rhabinopteryx subtilis** Mab.

K. D. and Bd., iii.

**Laphygma exigua** Hbn.**Elaphria clavipalpis** Scop.**Elaphria bodenheimeri** ssp. **chlorotica** Brsn.

M, Q, J. D., Kh., S and A. The autumn brood (x and xi) is very numerous; the spring brood, which consists of larger specimens, is the reverse. (iii and iv). This race comes closer to the Iranian race (*plesiarchia* Brsn) than the nomotypical Palestinian-Lebanese race, and indeed fuses with the former by transitional forms difficult to assign to either.

**Elaphria flava** Ob. (det. Brsn).

K. D., 27-iii to 11-iv-37. Boursin considers old records of this species from Palestine an error for *bodenheimeri*, which had not then been described. These are the first sure records out of N. Africa, and its occurrence in the southern desert parts of Palestine seems likely after all.

**Elaphria belucha** Swinh. b. sp. (det. Brsn)

P., M, and Kurdistan, in x. The type came from Quetta.

**Catamecia minima** Swinh.

A, 7-v and late x. The relation of this Sindian species to congeners described from Palestine and N. Africa requires further investigation.

**Pseudathetis fixseni** Chr.

A, in iv and again more commonly in x.

**Dysmillichia bicyclica** Stgr. (det. Brsn).

One, Q, 13-iii-37. Also at Tehran, ii-v-39, on hilly steppe at 5,000 ft., a quite waterless locality.

**Hadjina viscosa** Frr.

A, 27-iv, and 6-v-38.

**Aegle ottoi** Schaw.

Originally described from near M, I have a short series of this species from K. D., taken in v, and a longer series from A, taken in late iv. The markings vary somewhat in intensity.

**Aegle rebeli** Schaw.

M. D. and M. in v; M. N., 5-v-38. Also Kurdistan,

**Metaegle pallida** Stgr.

M. D. and M, common in v and vi. Also Kurdistan.

**Chloridea peltigera** Schiff.**Chloridea obsoleta** Fab.**Chariclea delphinii** f. **darollesi** Ob.

M. D., one (3-vi-35).

**Aedophron phlebophora** Led.

M. D., in vi and vii. This and the foregoing species only occur at the higher levels of the desert.

**Porphyrinia parva** Hbn.**Porphyrinia albida** f. **peralba** Schaw.

Of this form, probably the Iraqi subspecies, described from M, I have two examples from K. D. (4-v-37).

**Glaphyra lacernaria** Hbn. **cretula** Frr.

M. D., vi- 35.

**Tarache biskrensis** Ob. **orientalis** Brdt.

Bd., K. D., A., iv and early v.

**Tarache lucida** Hfn.

At A it was noted that the specimens flying in iv were typical, while those flying in v and the autumn were f. *insolatrix* or f. *albicollis* F. It is generally distributed.

**Anua tirrhaca** Cr.

P., iv-34. Cannot occur far from the wild pistaccio tree.

**Mormonia neonympha** Esp.

M. D., early vi.

**Anophia** sp.

M., 10-vii-35.

**Coryta vetusta** Walk. or **profesta** Chr.**Pericyma squalens** Led.**Pericyma albidentaria** Frr.**Cerocala sana** Stgr.

I have only taken the autumn brood, which shewed considerable variation, but, on the whole, had less yellowish hind wings than Beirut specimens. Flies near A, in x.

**Leucanitis kabylaria** B-Haas.,

A., 21-iv and 16-x.

**Syngrapha circumflexa** L.**Phytometra gamma** L.**Phytometra ni** Hbn.

**Raphia cheituna** Brdt.

I took three examples of this species, recently described from Bander Abbas, at Bsh., in late xi-40.

**Pandesma anysa** Guen.

M. (vii-ix), Bd. (ii-ix), K. D. (10 to 26-vi-37). The larvae were found in great numbers on *Populus euphratica* in iii and iv on an island in the Tigris. The main emergence at Bd occurs at the end of iv though odd specimens are seen earlier; larvae and imagines then continue to be found, at Bd, throughout the summer. At K. D. (far from the river), the species appeared in great numbers at light in vi, but not a single specimen before. The inference is that it can only breed continuously on the cultivated riverain tracts, and that desert examples are emigrants from such breeding grounds. A specimen was taken in an Elburz river valley at about 5,000 ft. on 28-v-39.

**Anumeta spilota** Ersch.

K. D., in early v.

**Anumeta major** Roths.

A., 26-v-38. This species may be the same as *spatzi* Roths.

**Aleucantitis flexuosa** Men.**Armada leprosa** Brdt.

D., 25-xi. Common about two months earlier at 6,000 ft. on the Bushire-Shiraz road.

**Armada panaceorum** Men.

A common insect from mid iii to early v on the stony desert. The easternmost localities (T. M., Q, etc.) seem to produce slightly browner specimens than the Syrian-Arabian desert side.

**Armada hueberi** Ersch.

Common to light along the Kurdish-Persian foothills, from T. M. to A. (iii and iv).

**Armada ornata** Brdt.

16-x-38, near A. A Persian species.

**Rhynchodontodes revolutalis** Z.

Very common along the river valleys but occurring also in unrelieved desert, in bushy places. I consider *eremialis* Swinh. and *syriacalis* Stgr. synonyms of this species, which thus ranges from Sind to Egypt, perhaps further west. The type of *revolutalis* is in the British Museum, and came from South Africa! There is no other specimen like it from S. Africa in the Museum collection, rich though it is in S. African material.

**Pingasa lahayei** Ob.

A., 22-v., and Bsh., late xi. Probably associated with the *Zizyphus* (nebek) tree.

**Neromia pulvereisparsa** Hamps.

N. S., 14-xi-39. Known from Aden, the Persian Gulf, and Palestine.

**Microloxa herbaria** Hbn. *advolata* Ev.

K. D., v-vi.

**Rhodometra sacraria** L.

M. D., vi; A: larvae on wild *beta* in hollows (the more usual foodplant is *Polygonum*).

**Scopula beckeraria** Led.

A characteristic insect of the poor steppes of the Middle East, appearing in a spring and an autumn brood. It is commoner at higher elevations, but occurs in the desert: Kh., xi; A., x.

**Glossotrophia asellaria semitata** Prt.

K. D., v; M. N., v; M. D., vi.

**Lithostege palaestinensis** Ams. ssp. n. **ali** Wilts.

Rather resembles *griseata* than the nominotypical form from Palestine, being darker grey, especially the hindwings. Varies somewhat in size. This must be the same species that was recorded in 1921 by the *Bombay N.H.S.* as *farinata*. It flies in iv and v at practically all the localities from F. G. southwards. At K. D. and N dwarf forms occur, doubtless due to the great aridity of the desert here.

**Lithostege notata** B-Haas.

T. M. (14-iii-36), one.

**Lithostege dissocyma** Prout.

The type was taken at T. M. on 14-iii-36. It laid eggs but I failed to persuade the young larvae to feed. No other specimen has yet been taken.

**Lithostege buxtoni** Prout.

One of the two types came from Shergat, a stony locality near Bi. The other came from between Kermanshah and Hamadan, Iran (c. 5,000 ft.) I have taken examples at Suleimani (Kurdistan), Kermanshah and Shiraz in xii.

**Eupithecia tesserata** Brdt.

A., iv. A common insect in Farsistan.

**Macaria syriacaria** Stgr.

Widespread, common in oases, but also a habitant of the unrelieved desert. Larva feeds on *prosopis stephaniana* and was described in *Mitt. Muench. Ent. Ges.* 1939, Heft 1.

**Dyscia plebejaria** Ob.

The typical Saharan form occurs at M. and K. D., in a spring and autumn brood.

**Gnopharmia erema** Whrli.

In early v at K. D. and M. N.

## PYRALS AND MICROS.

The determination of these is not yet complete, so they are omitted *in toto* from this paper.

## DOUBTFULLY DESERT SPECIES.

The following were taken at ambiguous localities, and not enough is known about them yet for one to attribute them with certainty to the ecological classes of desert-insects.

**Taragama siva** Lef.

This Indian species reaches as far as Bagdad, where it is chiefly attached to river and garden trees (*Populus euphratica*, apple, willow, pomegranate,

tamarisk) but also feeds freely on the small thorn *Prosopis stephaniana* on cultivated ground. There seems no reason why it should not accompany this thorn into the unrelieved desert, but the fact remains that the moth has not yet been noted there. In Bsh., and S. Mesopotamia it feeds on the *Prosopis* tree.

***Dyspessa bipunctata marginepunctata* Wilts.**

A., iv-38. This is the only place in the desert where I have taken this species, common higher up in the Zagros range. Its early stages are unknown. Another species of *Dyspessa* was also taken near Ahwaz but has not yet been identified.

***Agrotis exclamationis***

M., 25-vii-35, one only.

***Elaphria zobeidah* Brsn.**

M., Bd. in iii and x. It also occurs in high Persia.

***Spodoptera latebrosa* Led.**

A., in iv and ix. Bsh., in xi.

***Chloridea nubigera* H. S.**

A., 2-v.

***Leptosia velox rubescens* Schw.**

M. N., 3-v-38.

***Thermesia arefacta* Swinh.**

Like *siva*, feeds on *P. stephaniana* and has only so far been taken on irrigated ground or river-sides. Bd., and near A. Late summer and autumn.

***Chloroclystis lita palearctica* Brdt.**

A., 28-iv.

***Zamacra flabellaria* Heeg.**

Bd., 18-xii-35. Peile also took a series at Mirjana, on the Dyala near T. M. and I do not know if this locality was or was not ambiguous.